In the Claims:

1. (Currently amended) A method of separating gaseous alkene selected from the group consisting of ethylene, propylene and mixtures thereof, from a gaseous mixture including the alkene and hydrogen sulfide, the hydrogen sulfide present in amounts normally present in conventional cracked gas streams, the method comprising the steps of:

contacting the gaseous mixture with an adsorbent which preferentially adsorbs the alkene, at a selected temperature and pressure, thereby producing a non-adsorbed component and an alkene-rich adsorbed component; the adsorbent comprising a carrier having a surface area, the carrier having a monolayer of a silver compound dispersed on substantially the entire surface area, the silver compound releasably retaining the alkene; and the carrier comprising a plurality of pores having a pore size greater than the effective molecular diameter of the alkene; and

C1

changing at least one of the pressure and temperature to thereby release the alkene-rich component from the adsorbent;

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene in the presence of the hydrogen sulfide.

2. (Original) The method as defined in claim 1 wherein the silver compound is silver nitrate ($AgNO_3$) and the carrier is silica (SiO_2).

3. (Original) The method as defined in claim 1 wherein the silver compound is a silver salt, and wherein the salt is selected from the group consisting of acetate, benzoate, bromate, chlorate, perchlorate, chlorite, citrate, fluoride, nitrate, nitrite, sulfate, and mixtures thereof.

4. (Original) The method as defined in claim 1 wherein the carrier has a BET surface area greater than about 50 square meters per gram and up to about 2,000 square meters per gram, and comprises a plurality of pores having a pore size greater than about 3 angstroms and up to about 10 microns.

5. (Original) The method as defined in claim 1 wherein the carrier is a high surface area support selected from the group consisting of refractory inorganic oxide, molecular sieve, activated carbon, and mixtures thereof.

6. (Original) The method as defined in claim 5 wherein the refractory inorganic oxide is selected from the group consisting of pillared clay, alumina and silica.

7. (Original) The method as defined in claim 1 wherein the silver compound is a silver (I) halide and the carrier is silica.

C1

8. (Original) The method as defined in claim 1, wherein the selected pressure of preferential adsorption is a first pressure, and the pressure of release is a second pressure less than the first pressure, and wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and further wherein the second pressure is in a range of about 0.01 atm to about 5 atm.

9. (Original) The method as defined in claim 1 wherein the selected temperature of preferential adsorption is a first temperature, and the temperature of release is a second temperature greater than the first temperature, and wherein the first temperature is in a range of about 0°C to about 50°C, and further wherein the second temperature is in a range of about 70°C to about 200°C.

10. (Original) The method as defined in claim 1 wherein the retaining of the alkene is accomplished by formation of π-complexation bonds between the silver compound and the alkene.

11-14. (Please cancel these claims without prejudice.)

15. (Currently amended) A method for separating a diene from a mixture including the diene and <u>hydrogen sulfide</u> ~~a sulfur compound~~, <u>the hydrogen</u>

sulfide present in amounts normally present in conventional cracked gas streams, the method comprising the step of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and a majority of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π-complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the hydrogen sulfide ~~sulfur compound~~.

C1

16. (Original) The method as defined in claim 15 wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene and mixtures thereof, and wherein the method further comprises the step of changing at least one of the pressure and temperature to thereby release the diene-rich component from the adsorbent.

17. (Original) The method as defined in claim 15 wherein the diene is 1,3-butadiene, and wherein the mixture includes 1,3-butadiene and at least one other C_4 unsaturated compound.

18. (Original) The method as defined in claim 15 wherein the majority of the cationic sites of the ion-exchanged zeolite contain the silver cation.

19. (Original) The method as defined in claim 15 wherein the majority of the cationic sites of the ion-exchanged zeolite contain the copper cation.

20. (Original) The method as defined in claim 15 wherein the mixture comprises at least one mono-olefin having as many carbon atoms as the diene, wherein the diene is selected from the group consisting of butadiene, hexadien ,

octadiene, and mixtures thereof; and wherein the mono-olefin is selected from the group consisting of butene, hexene, octene, and mixtures thereof.

21. (Original) The method as defined in claim 20 wherein the mono-olefin is butene and the diene is butadiene.

22. (Original) The method as defined in claim 20 wherein the mixture comprises the mono-olefin in a gaseous state and saturated with the diene.

23. (Original) The method as defined in claim 15 wherein essentially all cationic sites of the ion-exchanged zeolite contain the silver cation.

24. (Original) The method as defined in claim 16 wherein the selected pressure of preferential adsorption is a first pressure, and the pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres.

25. (Original) The method as defined in claim 16 wherein the selected temperature of preferential adsorption is a first temperature, and the temperature of release is a second temperature greater than the first temperature, wherein the first temperature is in a range of about 0°C to about 150°C, and wherein the second temperature is in a range of about 70°C to about 250°C.

26. (Canceled)

27. (Previously amended) The method as defined in claim 32 wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene, and mixtures thereof.

28. (Previously amended) The method as defined in claim 27 wherein a selected pressure of preferential adsorption is a first pressure, and a pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres.

29. (Previously re-presented) A method of separating gaseous alkene selected from the group consisting of ethylene, propylene and mixtures thereof, from a gaseous mixture including the alkene and a sulfur compound, the method comprising the steps of:

contacting the gaseous mixture with an adsorbent which preferentially adsorbs the alkene, at a selected temperature and pressure, thereby producing a non-adsorbed component and an alkene-rich adsorbed component; the adsorbent comprising a carrier having a surface area, the carrier having a monolayer of a silver compound dispersed on substantially the entire surface area, the silver compound releasably retaining the alkene; and the carrier comprising a plurality of pores having a pore size greater than the effective molecular diameter of the alkene; and

C1

changing at least one of the pressure and temperature to thereby release the alkene-rich component from the adsorbent;

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene in the presence of the sulfur compound, wherein the sulfur compound is hydrogen sulfide, and wherein the hydrogen sulfide is present in amounts up to about 66 mole%.

30. (Please cancel this claim without prejudice.)

31. (Currently amended) The method as defined in claim 15 wherein ~~the sulfur compound is hydrogen sulfide, and wherein~~ the hydrogen sulfide is present in amounts up to about 66 mole%.

32. (Previously re-presented) A method for separating a diene from a mixture including the diene and a sulfur compound, the method comprising the steps of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene at a first temperature, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises zeolite A having exchangeable cationic sites, a plurality of the zeolite A sites having an alkali metal cation or an alkaline earth metal cation present; and

releasing the diene-rich adsorbed component from the adsorbent by elevating the temperature to a second temperature which ranges between about 70°C and about 120°C;

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the sulfur compound, wherein the sulfur compound is hydrogen sulfide, and wherein the hydrogen sulfide is present in amounts up to about 66 mole%.

33. (Please cancel this claim without prejudice.)

34. (Currently amended) A method for separating a diene from a mixture including the diene and hydrogen sulfide, <u>the hydrogen sulfide present in amounts normally present in conventional cracked gas streams,</u> the method comprising the step of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at least some of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π-complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the hydrogen sulfide.

35. (Previously added) The method as defined in claim 34 wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene and mixtures thereof, and wherein the method further comprises the step of changing at least one of the pressure and temperature to thereby release the diene-rich component from the adsorbent.

36. (Previously added) The method as defined in claim 34 wherein the diene is 1,3-butadiene, and wherein the mixture includes 1,3-butadiene and at least one other C_4 unsaturated compound.

37. (Previously added) The method as defined in claim 34 wherein a majority of the cationic sites of the ion-exchanged zeolite contain the silver cation.

C1

38. (Previously added) The method as defined in claim 34 wherein a majority of the cationic sites of the ion-exchanged zeolite contain the copper cation.

39. (Previously added) The method as defined in claim 34 wherein the mixture comprises at least one mono-olefin having as many carbon atoms as the diene, wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene, and mixtures thereof; and wherein the mono-olefin is selected from the group consisting of butene, hexene, octene, and mixtures thereof.

40. (Previously added) The method as defined in claim 39 wherein the mono-olefin is butene and the diene is butadiene.

41. (Previously added) The method as defined in claim 39 wherein the mixture comprises the mono-olefin in a gaseous state and saturated with the diene.

42. (Previously added) The method as defined in claim 34 wherein essentially all cationic sites of the ion-exchanged zeolite contain the silver cation.

43. (Previously added) The method as defined in claim 35 wherein the selected pressure of preferential adsorption is a first pressure, and the pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres.

44. (Previously added) The method as defined in claim 35 wherein the selected temperature of preferential adsorption is a first temperature, and the temperature of release is a second temperature greater than the first temperature, wherein the first temperature is in a range of about 0°C to about 150°C, and wherein the second temperature is in a range of about 70°C to about 250°C.

C1

45. (Previously added) The method as defined in claim 34 wherein the at least some of the sites have silver cation present.

46. (Previously added) The method as defined in claim 34 wherein the at least some of the sites have copper cation present.

47. (Previously added) The method as defined in claim 34 wherein essentially all cationic sites of the ion-exchanged zeolite contain the copper cation.

48. (Currently amended) A method for separating a diene from a mixture including the diene and hydrogen sulfide, the hydrogen sulfide present in amounts normally present in conventional cracked gas streams, wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene and mixtures thereof, wherein the mixture comprises at least one mono-olefin having as many carbon atoms as the diene, and wherein the mono-olefin is selected from the group consisting of butene, hexene, octene, and mixtures thereof, the method comprising the steps of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected t mperature and pressure, thereby producing a non-adsorbed

component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at least some of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π-complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the hydrogen sulfide;

changing at least one of the pressure and temperature to thereby release the diene-rich component from the adsorbent, wherein the selected pressure of preferential adsorption is a first pressure, and the pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres;

C1

and wherein the selected temperature of preferential adsorption is a first temperature, and the temperature of release is a second temperature greater than the first temperature, wherein the first temperature is in a range of about 0°C to about 150°C, and wherein the second temperature is in a range of about 70°C to about 250°C.

49. (Previously added) The method as defined in claim 48 wherein the mono-olefin is butene and the diene is butadiene.

50. (Previously added) The method as defined in claim 48 wherein the mixture comprises the mono-olefin in a gaseous state and saturated with the diene.

51. (Previously added) The method as defined in claim 48 wherein a majority of the sites have silver cation present.

52. (Previously added) The method as defined in claim 48 wherein a majority of the sites have copper cation present.

53. (Previously added) The method as defined in claim 48 wherein essentially all cationic sites of the ion-exchanged zeolite contain the copper cation.

54. (Previously added) The method as defined in claim 48 wherein essentially all cationic sites of the ion-exchanged zeolite contain the silver cation.

55-64. (Please cancel these claims without prejudice.)

65. (Previously added) The method as defined in claim 1 wherein the gaseous mixture is contained in a conventional cracked gas stream before any desulfurizing distillation steps.

C1

66. (New) The method as defined in claim 15 wherein the gaseous mixture is contained in a conventional cracked gas stream before any desulfurizing distillation steps.

67. (New) The method as defined in claim 34 wherein the gaseous mixture is contained in a conventional cracked gas stream before any desulfurizing distillation steps.

68. (New) The method as defined in claim 48 wherein the gaseous mixture is contained in a conventional cracked gas stream before any desulfurizing distillation steps.